

```
% Task 3. Parallel-plate capacitor
clear all;clc;
% The following lines produce interactive input of the design requirements
display('According to the given requirements:')
C=input('Enter the capacitance (in pF) ');
C=C*10^(-12);
V_rating=input('Enter the voltage rating (in V) ');
sf=input('Enter the safety factor ');
w=input('Enter the metal strip width (in mm) ');
w=w*10^(-3);

disp(' ')

m={'oil','teflon','polystyrene','quartz','paper','bakelite','ceramics'};

e_r=[2.1,2.1,2.7,3.8,4,5,6.9];% Relative permittivity of the materials
E_ds=[12,20,21,30,15,20,19];% Dielectric strength of the materials in MV/m
E_ds=E_ds*10^6;
p_diel=[1.5,2.9,2.7,7.6,3,5,6];% Price of the dielectric materials in USD/cm^3
p_diel=p_diel*10^6;
p_metal=0.02;% Price of the metal strip in USD/m

h_min=V_rating*sf./E_ds;% Minimal thickness of the dielectric layer
l=h_min*C/(8.85*10^-12)./e_r/w;% Length of the metal strip
cost_metal=2*l*p_metal;% Cost of the metal strips
cost_diel=h_min.*l*w.*p_diel;% Cost of the dielectric filling
cost_total=cost_metal+cost_diel;% Total cost of the capacitor's materials

[cost_min,n]=min(cost_total);% Gets the value and the index of the lowest cost

material=m(n);
thickness=h_min(n)*10^6;
length=l(n)*10^3;

disp('Design specifications:')
disp(' ')
disp('Dielectric material')
disp(material)
disp(' ')
disp('Dielectric layer thickness in micrometers')
disp(thickness)
disp(' ')
disp('Length of the strips in millimeters')
disp(length)
disp(' ')
disp('Cost of the materials in USD')
disp(cost_min)
```